

INVESTIGATING THE ORIGIN OF LSP VARIATIONS

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Long secondary period (LSP) variables are so named because they are late type giants with both long period variation and shorter period pulsation. While approximately 25 - 30% of all pulsating AGB stars show LSP behavior there is no known physical cause for the longer period. LSP variables are the only form of stellar variability that is not understood. However, LSP variables are known to obey a period-luminosity (P-L) relation. This limits the possible causes to two causes: binarity and pulsation. Strong arguments can be made against both binarity and radial pulsation. The remaining possibility is non-radial pulsation. While the long period mode fits this violates current interior models. We propose to use Kepler high precision photometry to look for higher order non-radial pulsation modes. Fourier analysis of the light curve should readily identify these modes. If found the techniques of asteroseismology will be applied. In the absence of non-radial pulsations, we will explore the detailed long term light curve to see if it agrees to high precision with models of ellipsoidal variations. Either the binary or the pulsation models allow interesting outcomes. The binary model involves near-planet sized companions with orbits evolved into a very specific configuration. The pulsation model is forbidden by present stellar interior models and will drive new understanding of stellar interior structure.